TAIYO
POWER AND STORAGE

Parc Solar Caenewydd, Swansea

AGRICULTURAL CONSIDERATIONS

Development of National Significance in the Renewable Energy Sector
Application Submission

On behalf of **Taiyo Power & Storage Limited**

December 2023 | P21-2998

PARC SOLAR CAENEWYDD, LLWCHWR

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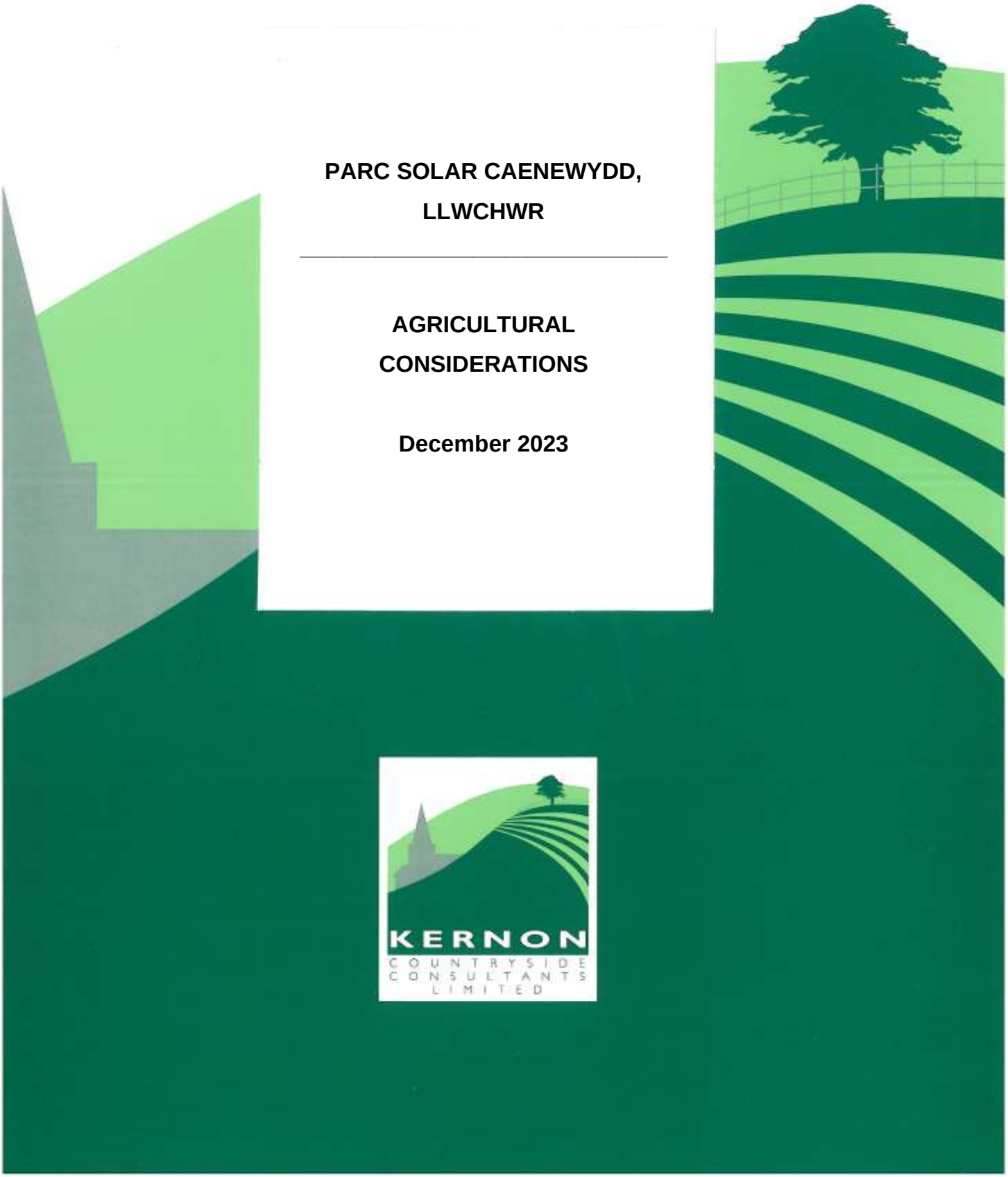

KERNON
COUNTRYSIDE CONSULTANTS LIMITED

PARC SOLAR CAENEWYDD,
LLWCHWR

AGRICULTURAL
CONSIDERATIONS

December 2023

Authorised By APK 12/23

Greenacres Barn, Stoke Common Lane, Purton Stoke, Swindon SN5 4LL
T: 01793 771333 Email: info@kernon.co.uk Website: www.kernon.co.uk

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1 INTRODUCTION

Scope of Report

1.1 Parc Solar Caenewydd is a proposed solar and green infrastructure facility on farmland to the northeast of Gowerton. The proposed development is shown below, from the Green Infrastructure Plan P21-2998_13.

Insert 1: The Application Site

1.2 The majority of land within the application site is in agricultural use. Panels will be installed on only part of the agricultural land, and there are extensive areas where panels will not be installed, as shown above, which form green infrastructure proposals.

1.3 This report considers the agricultural circumstances of the site, in particular the soils and agricultural land quality and the farming enterprises, and assesses the effects of the proposed development on those assets. The report assesses the effects against the relevant planning policy and guidance.

1.4 A response providing technical information on the agricultural land quality by the Welsh Government Agricultural Land Use and Soil Policy Advisor, dated 30th September 2022, confirmed that a detailed field survey of ALC is not required at this location. It was confirmed that "**the Department does not consider BMV land to be present at this site and therefore Planning Policy Wales paragraph 3.58 and 3.59 would not apply**".

Structure of Report

1.5 The report is structured as follows:

(i) section 2 describes the planning policy and guidance relevant to agricultural land and renewable energy projects;
(ii) section 3 describes the agricultural land quality and farming circumstances of the site;
(iii) section 4 describes the proposals, how the panels will be installed, their layout and spread, and related fixed equipment;
(iv) section 5 considers the effects on agricultural land quality and the policy implications;
(v) section 6 considers the farming and economic considerations;
(vi) section 7 sets out a summary and conclusions.

The Author

1.6 The report has been prepared by Tony Kernon. I am a rural Chartered Surveyor and a Fellow of the British Institute of Agricultural Consultants. I have over 35 years of experience in rural development and agricultural land matters, including having acted as the Welsh Government's agricultural advisor on numerous infrastructure projects, and having assessed many solar farm proposals across Wales and England.

2 PLANNING POLICY AND GUIDANCE

Future Wales: The National Plan (2040)

2.1 Future Wales was published in 2021. The document recognises that productive land is a vital resource. The Best and Most Versatile agricultural land, which is defined as land in ALC Grades 1, 2 and 3a, is mapped on page 27.

2.2 Policy 17 addresses Renewable and Low Carbon Energy and Associated Infrastructure, noting strong support for the principle of developing renewable and low carbon energy. There is no mention of agricultural land quality in this section.

2.3 Policy 18 addresses Developments of National Significance (DNS). It notes that DNS development will be permitted subject to 11 criteria. None of these specifically mention agricultural land, although criterion 10 refers to the sustainable use of resources needed for or generated by the development.

2.4 Ministers have considered alternatives to new large-scale electricity generation infrastructure, page 97 notes, but recognise that these "**will not enable us to meet those objectives on their own**". It is clear that agricultural land will be required to meet targets.

Planning Policy Wales

2.5 Planning Policy Wales (Edition 11, 2021) (PPW) defines the "best and most versatile agricultural land" (BMV) in paragraph 3.58 as that falling within Grades 1, 2 and 3a of the Agricultural Land Classification (ALC). Such land is a finite resource which should be conserved for the future.

2.6 There is no bar on development on such land, but the policy advises that "**considerable weight should be given to protecting such land from development because of its special importance**".

TAN 6 (2010)

2.7 Technical Advice Note 6 "Planning for Sustainable Rural Communities" sets out further advice in section 6. TAN 6 is now almost 12 years old, but advises that "**once agricultural land is developed, even for "soft" uses such as golf courses, its return to agriculture as best and most versatile agricultural land is seldom practicable**" (paragraph 6.2.2).

2.8 Paragraphs 6.2.6 to 6.2.9 advise on other relevant considerations, notably:

- effects of severance and fragmentation on farm structure;

- effects on buildings and fixed infrastructure;
- impacts on irrigation, where practised;
- wider effects, such as field underdrainage.

2.9 Annex B sets out the procedural requirements for consultation with the Welsh Government for development which "**would involve the loss of 20 hectares or more of Grades 1, 2 or 3a agricultural land, or a loss which is less than 20 ha but is likely to lead to further losses amounting cumulatively to 20 ha or more**" (paragraph B2).

Local Policy

2.10 The Swansea Local Development Plan 2010 – 2025 (2019) does not contain a policy relating to development on agricultural land other than in connection with the disposal of inert waste (RP11).

2.11 The "Placemaking and Place Management" policy PS2 sets out development management criteria, and in the Council's pre-application response (22nd November 2022) they referred to criterion PS2 (xii) "**avoid the loss of land and/or premises that should be retained for its existing use or as open space**" as including covering the use of BMV agricultural land.

WG Guidance Notes

2.12 The Welsh Government has produced a predictive ALC map and it is accompanied by a number of documents including a Guidance Note (version 2.1, May 2021). This refers to the predictive map and sets out when field survey is required, which is where land is shown as potentially of Grades 1, 2 and 3a.

2.13 The "**ALC: Frequently Asked Questions**" (May 2021) document explains that "**normal agricultural management will rarely, if ever, affect the ALC grading of land**". The ALC is based on long-term physical and chemical limitations, and current or historic agricultural management does not affect grade. "**ALC grade could potentially only be improved by very major and expensive interventions, well beyond the scope of normal agricultural works**." The document is reproduced at **Appendix KCC1**.

2.14 The Welsh Government's consultee confirmed that field survey is not required in this case, see **Appendix KCC2**.

3 THE AGRICULTURAL CIRCUMSTANCES

3.1 This section of the report considers the circumstances in two stages:

(i) agricultural land and soils;

(ii) agricultural land use.

Agricultural Land Quality

3.2 Agricultural land is graded under a system devised by MAFF in the 1970s and last amended in 1988, "Agricultural Land Classification of England and Wales: revised guidelines and criteria for grading the quality of agricultural land" (MAFF 1988).

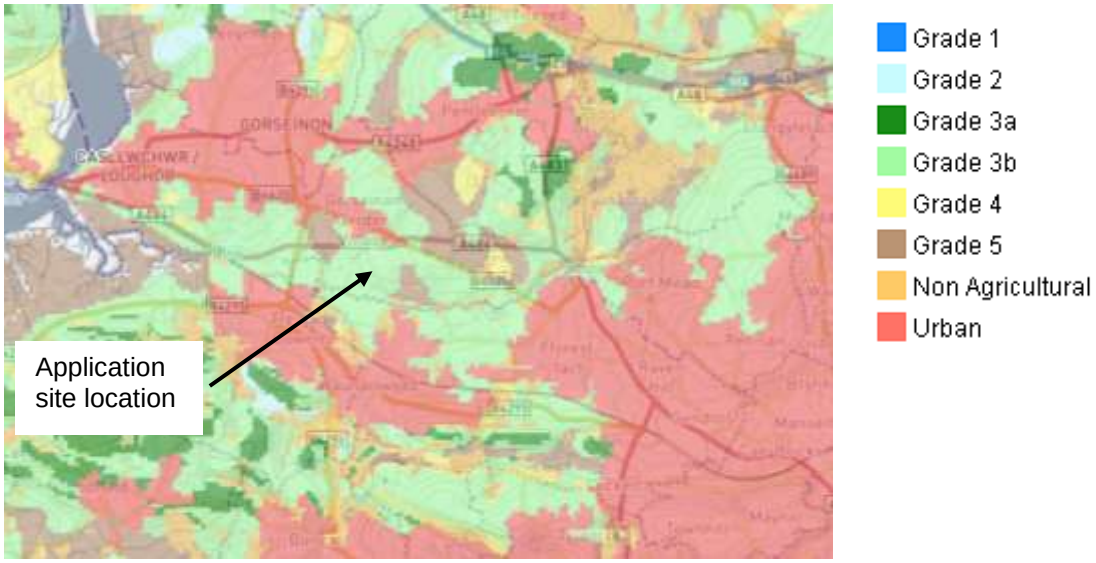
3.3 The criteria for grading are based on the long-term physical limitations of land for agricultural use, such as **climate** (temperature, rainfall, aspect, exposure and frost risk), **site** (gradient, micro-relief and flood risk) and **soil** (texture, structure, depth and stoniness, and also chemical properties which cannot be corrected), and interactions between these factors such as soil wetness, droughtiness and erosion.

3.4 The ALC system divides land into five grades, with Grade 3 divided into two subgrades with the grades defined as follows:

- Grade 1 excellent quality;
- Grade 2 very good quality;
- Subgrade 3a good quality;
- Subgrade 3b moderate quality;
- Grade 4 poor quality;
- Grade 5 very poor quality.

3.5 The Predictive ALC Map 2 (2020) shows the general area as mostly Subgrade 3b. There are smaller areas of Subgrade 3a and of Grades 4 and 5 further afield, but not within the application site, as shown on Insert 2 below.

Insert 2: Predictive ALC of the Wider Area



3.6 The site comprises mostly Subgrade 3b “moderate quality” agricultural land, as shown below, with some Grade 5 “very poor quality”.

Insert 3: ALC of the Site Area

3.7 The part of the site shown as Grade 5 “very poor quality” is shown below.

Insert 4: ALC of Central Part of the Site

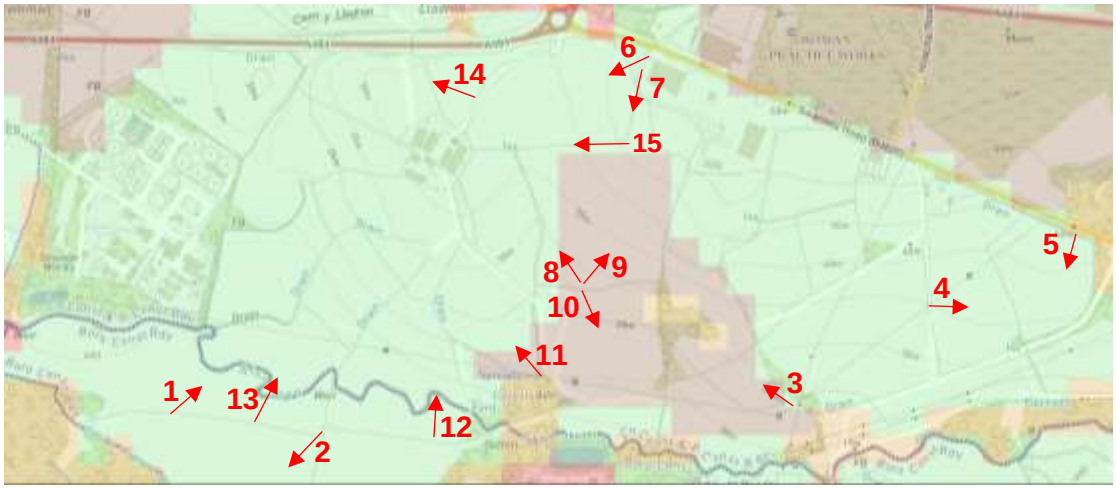
3.8 Accordingly none of the site is “best and most versatile” agricultural land.

Agricultural Land Use

3.9 Most of the proposed site is occupied by Business A, Penyfodau Fawr. The eastern fields are occupied by Business B and let annually for grazing.

3.10 Photographs of the Site and adjacent land are shown below from the following locations.

Insert 5: Location of Photos



3.11 Most of the southern fields are permanent grassland.

Photo 1: NE towards farm buildings

Photo 2: Adjacent land to the south

Photo 3: Looking NW

Photo 4: Looking east. Archaeological dig in progress

Photo 5: Looking south

3.12 The central part of the site is also grassland.

Photo 6: From the north looking southwest towards farm buildings

Photo 7: Looking south over central part of the farm

3.13 The area of Grade 5 is shown in the three photographs below.

Photo 8: Grade 5 in the foreground

Photo 9: Grade 5 grazing land

Photo 10: Grade 5 looking SE

3.14 To the south and west of the buildings the land is either grassland or, at the time of survey, had been and was being used to grow pumpkins.

Photo 11: Grazing land

Photo 12: Grazing and pumpkins

Photo 13: Central part of the farm (zoom lens)

3.15 The top field near the farmyard is shown below.

Photo 14: Near the farmyard

3.16 The farm buildings contain livestock and general purpose agricultural buildings, plus a farm shop.

Photo 15: The farm buildings

3.17 Farm **Business A** includes a farm shop which sells a range of products. Photographs of some of the range are provided in **Appendix KCC3**, taken from pages on the farm shop's Facebook page. A few are shown below. The shop sells cheeses, eggs, fruit, vegetables, pies, ice cream, cakes, vacuum packed meat and meat products, fruit juices, and seasonal items (eg home-grown pumpkins, Christmas trees). These items, other than pumpkins, are almost all bought-in (ie they are not grown on the farm).

Inserts 6 – 9: Farm Shop Photos (from Facebook)

3.18 Across the grassland cattle are grazed, such as those shown below.

Photo 16: Some of the cattle being grazed

3.19 The majority of the land forms Penyfodau Fawr.

3.20 **Business B** occupies grazing land, let annually, at the eastern end of the application site, shown in photographs 4 and 5 above.

4 THE PROPOSALS

Layout

4.1 The proposed layout is shown on the application plans and in reduced scale below.

Insert 10: The Layout (from Plan P21-2998_13)

Stages of Construction

4.2 A solar farm is installed in five key stages:

(i) marking out;

(ii) piling-in of legs;

(iii) bolting together of frames;

(iv) bolting-on of panels;

(v) cabling and trenching.

4.3 In parallel will be the creation of tracks and fixed infrastructure, and biodiversity works.

4.4 Panels are installed rapidly. The process involves marking out the grid on the grass and laying out the steel stanchions. This stage is non-intrusive. It does involve machinery carrying the legs, however, and should take place when soils are suitably dry. Typically a tractor and farm trailer are used to transport the legs to the fields, then each leg is lifted off by hand.

4.5 A team then arrives to knock the stanchions / legs in. From operations we have observed it takes a little over a minute per pole to knock the pole into the ground and move the

machine to the next pole[1]. This operation is shown in the photograph below. This was inserting legs into a clay soil.

Photo 17: Legs Being Installed

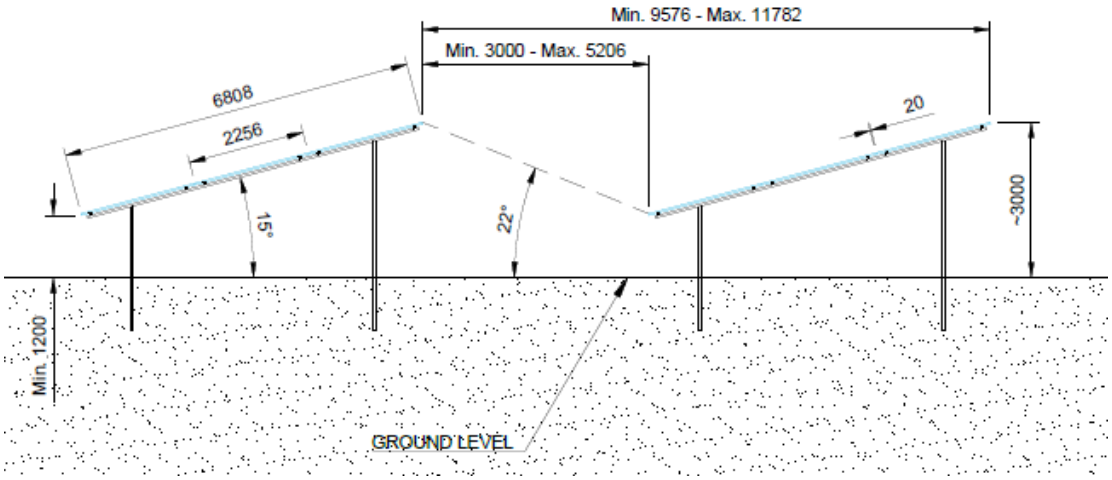
4.6 The design varies between sites, but the limited impact of installing legs on the underlying land is illustrated below.

Photos 18 and 19: Legs Installed (this at Bentham Farm, Purton)

[1] This observation was made on clay soils at the Purton Solar Farm, Wiltshire, in 2015. Ground conditions will inevitably affect installation speed.

4.7 The panel design at Parc Solar Caenewydd will be taller than shown above, and this will enable sheep to be grazed. An excerpt from the panel design plans is shown below.

Insert 11: Excerpt Showing Panel Design



4.8 The minimal damage, if carried out in dry conditions, of bolting-on the panels is shown below.

Photo 20: After Panels Bolted-on

4.9 The following photograph shows panels installed in winter, when ground conditions were generally poor. The soil was, however, easily restored following installation, as shown below.

Photos 21 and 22: Panels Installed in Poorer Conditions

4.10 It is necessary to connect electric cables between the panels and to run the cables back to the substation. This involves trenches, dug with a machine. Immediately after digging these look disruptive to the soil, but they are installed in a similar way to field drainage pipes. Typically topsoil and subsoil are separated, as below.

Photos 23 and 24: Cabling Channels During Cable Installation

4.11 The installation of cables is one of the few operations that involves digging whereby the soil structure could potentially be affected. The trenches are always narrow, but soil does have to be dug up to install the cable. In this country we have been burying services (water, oil, gas, telecomms) for many years. In areas where there is a clear subsoil and topsoil distinction, the topsoil should be placed on one side of the trench, and the subsoil on the other. Then once the cable has been laid the subsoil can be added back first, then the topsoil second, to reinstate the soil structure to its original order and state.

4.12 That means that soils are restored and settle within days, and return to grass growth rapidly.

Photo 25: The Area Two Weeks Later

This photo was taken 14 days after the trench was first dug.

4.13 Overall, therefore, the panel installation will not result in adverse effects on soils or agricultural land quality.

4.14 The land is, however, susceptible to damage when trafficked in wet conditions, such as shown below. So far as possible travelling across the land in wet conditions should be avoided, and panels should be installed in the drier months.

Photos 26 and 27: Soils Being Affected by Winter Vehicle Travel

Infrastructure and Tracks

4.15 The construction of the new internal access tracks and bases for the fixed equipment will require the movement of soils. Accordingly these works need to be undertaken when ground conditions are suitable.

4.16 The creation of tracks requires topsoil to be scraped off to a shallow depth, typically 25-30cm. This is stored in a low bund beside the track or nearby. A permeable membrane is then laid onto the soil and the track surface is then created by importation of material. An example is shown below.

Photo 28: Creation of Access Track (detail)

4.17 Construction of the bases for the transformers is similar. The topsoil is removed and stored in a bund for later replacement, a membrane is added and a surface installed. The equipment then stands on the base, similar to the example below.

Photo 29: Typical Equipment

4.18 The area for the battery and substation will involve more extensive earthworks, in order to create a level base. Cut and fill will be carried out. Surplus topsoil will be stored in a suitable bund, with subsoil levelled across the site to create a base.

4.19 Topsoil bunds will be seeded with grass seed and will be maintained, with all vegetation suitably managed.

Photo 30: Example of Topsoil

4.20 Further details are set out in **Appendix KCC5**.

Connecting Cable Route

4.21 The Site will be connected to the grid via cables. The options being considered will involve following the public highway and will not involve agricultural land.

4.22 The installation of the cable route will involve a temporary works, following public highways and will not result in any loss or downgrading of agricultural land.

5 LAND QUALITY AND POLICY IMPLICATIONS

5.1 The application site is a mixture of Subgrade 3b "moderate quality" agricultural land and Grade 5 "very poor quality" agricultural land.

5.2 None of the land falls within the definition of the "best and most versatile" agricultural land.

5.3 Accordingly the policy in PPW (2021) at paragraphs 3.58 and 3.59 is not engaged. There are no agricultural objections to the use of such land, irrespective of whether or not agricultural land quality is adversely affected.

5.4 This was confirmed by the Welsh Government (**Appendix KCC2**) and in the City and County of Swansea's pre-application consultation response, the relevant excerpt of which is reproduced in **Appendix KCC4**.

5.5 A similar approach has recently been confirmed by the Minister for Climate Change in the decision at Bryn-y-rhyd Farm, Llanedi, Ponterdulais (DNS/3260565). The Minister's decision letter summed up the agricultural matters as follows:

"**53 The site comprises agricultural land of subgrade 3b and is not Best and Most Versatile ("BMV") agricultural land. (IR 261)**

54 The Inspectors note several representators have raised concerns about the loss of agricultural land currently used for dairy, beef and sheep production. Whilst the proposal would necessitate altered management practices on the affected farm holdings, the Inspectors consider there is little evidence the arrays would prevent the viable use of land for agriculture and conditions would be secured by condition to protect the soil resource. Subject to these conditions, the Inspectors are satisfied the proposal accords with FW policy 17 and LDP policy SP14. As the proposed development would be time limited it would avoid permanently sterilising any minerals resource and, therefore, accords with LDP policy MPP3 "Mineral Safeguarding". (IR 262 – 263)".

Conclusions

5.6 There is no constraint to the solar farm installation on the basis of agricultural land.

Soil Management Plan

5.7 An outline Soil Management Plan, setting out the key principles, is contained at **Appendix KCC5**.

6 FARMING AND ECONOMIC CONSIDERATIONS

Policy

6.1 There is no policy in Future Wales or PPW that addresses the economic implications of development involving change of use or loss of agricultural land. There is no policy in the Local Development Plan.

6.2 TAN 6 (2010) sets out that other relevant considerations could include:

(i) the effect of development on farm size and structure. The loss of part of a farm, and the effect of severance and fragmentation, may be relevant;

(ii) the efficiency of farms which can be affected by the condition and extent of buildings and fixed equipment, and the effects of development may be relevant;

(iii) the effects of development on land drainage systems or surface water drainage.

Farm Size and Severance

6.3 The proposed development will involve the whole of the Penyfodau Fawr farm area. As such it will not result in problems arising from severance or fragmentation.

6.4 The farm enterprises as they are currently operated will need to change. The current enterprise involves rearing of beef cattle. It will not be possible to rear beef cattle around and between the panels.

6.5 There are open areas within the development where grazing by cattle could take place.

6.6 Under the panels, grazing by sheep will be possible and forms a good way to manage the grassland. Sheep grazing between and beneath panels is a feasible agricultural use, as the following photographs shown.

Photos 31 and 32: Sheep Grazing Beneath Panels

Note: It is difficult to film sheep below panels as sheep tend to run away from visitors.

6.7 Sheep grazing will involve similar amounts of labour to cattle grazing, and the economics (whilst variable, as is common with all agricultural enterprises) are not dissimilar. Therefore there are no significant economic impacts.

6.8 Whilst the farm shop sells some seasonal products produced on the farm, it also sells many products not produced on the farm. The change from beef grazing to sheep grazing land will not affect the potential of the farm shop to continue operating and still produce seasonal products on the replacement land and to sell the same imported products.

6.9 It is recognised that the farm would not be able to grow so many pumpkins as were grown in 2022.

6.10 The Developer and the Jones family of Penyfodau Fawr are working together to secure the future of this successful farming business. This will mean that the family will continue to operate the farm and live in and use the farmstead, and the Penyfodau Fawr Farm shop will remain. The Developer's investment and collaboration with the family and the Landlord has resulted in the new provision of alternative farmland in the local area.

6.11 Agricultural use of the land can continue. There are no other significant economic or severance impacts.

6.12 The eastern land is let on short-term grazing agreements, and there will be no significant effect on any farm business as a consequence.

Efficiency of Farms

6.13 TAN 6 sets out the potential effects of development of part of a holding on capital investment. In this case the farm buildings will remain and can continue to be used. There are no significant adverse effects on investment decisions taken.

Other Consequences

6.14 There will be no other agricultural consequences for land outside the application site, such as effects on water supply or under-field drainage.

7 SUMMARY AND CONCLUSIONS

7.1 The proposed development involves agricultural land, including land part of Penyfodau Fawr.

7.2 The land is all shown as either Subgrade 3b or Grade 5 on the predictive Agricultural Land Classification.

7.3 The development involves solar panels across part of the land, with extensive areas of green infrastructure and wildlife habitat improvements.

7.4 There is no policy constraint in Planning Policy Wales (2021) to development involving lower quality agricultural land.

7.5 The combination of a solar farm and green infrastructure does not adversely effect the agricultural land quality. Soils can be affected by installation practices, but if carried out when the conditions are suitable the soils should be little affected. Any negative impacts can usually be recovered easily with standard agricultural machinery.

7.6 The connecting cables can be installed without causing significant damage to or downgrading of agricultural land.

7.7 The existing farm business occupying most of the land will need to change. It currently operates a beef enterprise, and once the panels are installed only sheep will be able to graze those areas under and around the panels. In terms of labour needs and economic output, there will be little change.

7.8 The farm shop that operates within the site is dependent upon purchased-in produce. This will continue, with no significant need to alter the mix and range of products sold.

7.9 Overall there should be no agricultural reasons to resist the proposed development.

APPENDIX KCC1

Welsh Government's Frequently Asked Questions (May 2021)

Agricultural Land Classification
Frequently Asked Questions
May 2021.

Llywodraeth Cymru
Welsh Government

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What do the different grades mean? 3
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A FULL DESCRIPTION OF THE GRADES CAN BE FOUND IN APPENDIX 1. 3

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Can you recommend an ALC surveyor? 5
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Does Natural England carry out ALC surveys? 5
What sampling density should I use in my ALC field survey? 6
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APPENDIX 1: AGRICULTURAL LAND CLASSIFICATION (ALC) 7

Descriptions of the Grades and Subgrades 7
Grade 1: Excellent Quality Agricultural Land 7
Grade 2: Very Good Quality Agricultural Land 7
Grade 3: Good to Moderate Quality Land 7
Subgrade 3a: Good Quality Agricultural Land 7
Subgrade 3b: Moderate Quality Agricultural Land 7
Grade 4: Poor Quality Agricultural Land 7
Grade 5: Very Poor Quality Agricultural Land 8
Descriptions of other land categories used on ALC maps 8
Urban 8
Non-agricultural 8
Woodland 8
Open water 8
Land not surveyed 8

General Background Questions

What is the ALC system?
The Agricultural Land Classification (ALC) system provides a method for assessing the quality of farmland in England and Wales. The ALC system classifies land into five grades, with 1 being the best and 5 being the worst and Grade 3 subdivided into Subgrades 3a and 3b. The current grading methodology is described in The Agricultural Land Classification of England and Wales Revised Guidelines and Criteria for Grading the Quality of Agricultural Land (MAFF 1988) sometimes referred to as 'The Blue Book'.

What is agricultural land?
Agricultural land is land which is capable of being used for agricultural purposes (e.g. cropping).The current use of the land does not affect the grade or agricultural potential of the land. Where the potential for agriculture has been irreversibly lost (e.g. through housing development) the land should no longer be classed as agricultural. For planning purposes, it is recommended that the Local Planning Authority is contacted to confirm the status of the land. Also see: Can land be high grade if it is not cropped or is used for grazing?

What is ALC used for?
The ALC is used to grade the quality of agricultural land so that informed decisions can be made over its future use within the planning system. The planning systems in England and Wales seek to conserve the 'Best and Most Versatile (BMV) agricultural land. Government policies in **Wales** with regard to BMV land can be found on the Welsh Government ALC webpages at: Welsh Government Web Topic - Agricultural Land Classification BMV policies in **England** are set out in the National Planning Policy Framework.

What is Best and Most Versatile agricultural land?
National planning policy defines the Best and Most Versatile agricultural land as land within grades 1, 2 and 3a. This is good to excellent quality land which can best deliver the food and non-food crops for the future.

How does the Agricultural Land Classification system grade land?
The criteria for grading are based on the long term physical limitations of land for agricultural use, such as **climate** (temperature, rainfall, aspect, exposure and frost risk), **site** (gradient, micro-relief and flood risk) **and soil** (texture, structure, depth and stoniness, and also chemical properties which cannot be corrected), and interactions between these factors such as soil wetness, droughtiness and erosion. Field survey to obtain site and soil data is required. The current grading methodology is described in: The Agricultural Land Classification of England and Wales Revised Guidelines and Criteria for Grading the Quality of Agricultural Land (MAFF 1988)

What do the different grades mean?

Generalised Description of the Agricultural Land Classification Grades

Grade & standard colour notations	Description of agricultural land	Detail
1	Excellent quality	No or very minor limitations on agricultural use. Wide range of agricultural and horticultural crops can be grown. High yielding and consistent.
2	Very good	Minor Limitations on crop yield, cultivations or harvesting. Wide range of crops but limitations on demanding crops (e.g. winter harvested veg). Yield high but lower than Grade 1.
3 (subdivided)	Good to moderate	Moderate limitations on crop choice, timing and type of cultivation, harvesting or level of yield. Yields lower and more variable than Grade 2.
3a	Good	Moderate to high yields of narrow range of arable crops (e.g. cereals), or moderate yields of grass, oilseed rape, potatoes, sugar beet and less demanding horticultural crops.
3b	Moderate	Moderate yields of cereals, grass and lower yields other crops. High yields of grass for grazing/ harvesting.
4	Poor	Severe limitations which restrict range and/or level of yields. Mostly grass and occasional arable (cereals and forage), but highly variable yields. Very droughty arable land included.
5	Very poor	Severe limitations which restrict use to permanent pasture or rough grazing except for pioneering forage crops.

A full description of the grades can be found in Appendix 1.

Can land be high grade if it is not cropped or is used for grazing?
The current land use does not affect the grade or longer term agricultural potential of the land. Land use is an economic and management choice of the land manager. The ALC grade describes what the land is potentially capable of, not what it is currently used for.

Can the ALC grading be changed by farming practices?
Normal agricultural land management will rarely, if ever, affect the ALC grading of land. The grading is based on the long term physical and chemical limitations of land for agricultural use. The current or historic agricultural management, or intensity of use, does not affect the ALC grade. ALC grading could potentially only be improved by very major and expensive interventions, well beyond the scope of normal agricultural works. Examples could include major new drainage schemes, new flood defence systems or infilling / levelling of highly uneven land. It is extremely unlikely that an ALC grading would drop because of neglect or poor agricultural management.

Will fertilizer improve the grade?
Applications of fertiliser or lime are part of the normal management of agricultural land and do not affect the grade. Normal fertiliser levels in the soil have no bearing on ALC grade. Chemical limitations in ALC relate to major long term problems that cannot easily be remediated. These can include extreme acidity, saline environments and presence of toxic elements.

What can I grow on my land? (Crop suitability)
The suitability of land for certain crops is determined by a variety of factors. The ALC Grade of the land doesn't determine what can be grown, but indicates the type of crops that are generally suited to land of that quality and versatility. Typical crops are given in Appendix 1.

Are land values determined by ALC grade?
The ALC system was developed to inform land use planning decisions. The use of the ALC system for land valuation has never been intended and should not be used for this purpose.

Grade and Map Questions

What is the grade of my land?
The only way to accurately determine the agricultural grade of land is by way of a detailed field survey in accordance with the current ALC 1988 guidelines. What does a detailed field survey involve?

In **Wales**, the Welsh Government holds detailed field survey information for selected areas and a predictive map which can be found at http://lle.gov.wales/map/alc2. For further information please contact LQAS@gov.wales.

The most up-to-date information on ALC Grades in **England** can be found on www.Magic.gov.uk/ (Landscape tab). Detailed field surveys (Post 1988 ALC layer on the Magic website) are available for selected areas. Also see: What about strategic maps showing the likely occurrence of best and most versatile land mentioned in TIN049?

Why do different maps show different grades for the same area?
ALC assessments became more field based and site specific from 1976, partly due to limitations of the Provisional mapping. On 1 January 1989, the current system of ALC grading was introduced: (*The Revised guidelines and criteria for grading the quality of agricultural land*: MAFF 1988). The guidelines provide the most definitive ALC grading and normally supersede any earlier surveys. In some areas there will be several different levels of detail of ALC data. Soils are variable and the grade of the land can vary over small distances. The ability to map this variation depends on the scale of the survey and the associated scale of mapping. The most detailed survey will usually represent the most definitive grading.

What are the 'Revised Guidelines'?
The ALC was devised and introduced in the 1960s and Technical Report 11 (MAFF, 1966: Technical Report 11, Agricultural Land Classification of England and Wales) outlined the national system. Following a review of the system, criteria for the sub-division of Grade 3 (3a, 3b & 3c) were published in 1976 and Technical Report 11/1 (MAFF, 1976: Technical Report 11/1, Agricultural Land Classification of England and Wales. The definition and identification of Sub-grades within Grade 3) outlined the updated.

The new and most up-to-date guidance was issued in 1988 "The *Revised guidelines and criteria for grading the quality of agricultural land*". This was implemented from 1 January 1989. The 1988 Revised guidelines were developed and tested with the aim of updating the system without changing the original concepts. This recognises two subgrades within in Grade 3: Subgrade 3a and Subgrade 3b, the latter being a combination of the previous Subgrades 3b and 3c. Consequently, modern ALC surveys are sometimes referred to as 'post 1988' or post revision. Any surveys carried out using the old guidelines (sometimes referred to as pre 1988 surveys or pre revision) would need to be reassessed under the current criteria.

Survey Related Questions

There is no detailed survey of my land, is a field survey required?
It depends why you want to know the grade of your land. For a planning purpose you should contact your local planning authority for advice.

What does a detailed field survey involve?
ALC surveys are undertaken, according to the published Guidelines by field surveyors using hand held augers to examine soils to a depth of 1.2 metres. This usually consists of one boring per hectare, supplemented by digging occasional small pits (usually by hand) to inspect the soil profile at representative locations to provide more detailed information about soil conditions to depths up to 1.2 metres. Information obtained by these methods is combined with climatic and other data to produce an ALC map and report, which will normally include individual soil profile and pit descriptions, and written explanations to support the grading applied. ALC maps are normally produced on an Ordnance Survey base at varying scales from 1:10,000 for detailed work to 1:50 000 for reconnaissance survey. It is important that ALC surveys are completed by an experienced ALC surveyor to ensure that the evidence is accurate and robust to inform planning decisions.

Can you recommend an ALC surveyor?
The Institute of Professional Soil Scientists (the professional body of the British Society of Soil Science) maintains a register of competent soil surveyors who have experience of carrying out ALC surveys. www.soils.org.uk. Other professional bodies may also maintain lists of their members who undertake ALC work. It is important that ALC surveys are completed by an experienced ALC surveyor to ensure that the evidence is accurate and robust to inform planning decisions.

Is urban land subject to ALC surveys?
Urban land may be shown on ALC survey maps. It will normally not be surveyed because the land has relatively little potential for return to agricultural use. The full definition of urban and other non-agricultural categories in the ALC system can be found in Appendix 1. You should contact your local planning authority for advice on whether an ALC survey is required to support a planning application.

Does the Welsh Government carry out ALC (detailed field) surveys?
Yes. The Welsh Government does carry out detailed Agricultural Land Classification (detailed field) surveys. These surveys are undertaken largely in response to requests from Local Planning Authorities for individual sites or areas at the urban edge which are being considered for development. The Welsh Government also holds copies of detailed individual Agricultural Land Classification (ALC) surveys carried out by them, as well as the former Welsh Office or Welsh Assembly Government. In addition the Welsh Government also provides a site survey validation service for Local Planning Authorities providing a technical assessment of submitted reports and enables them to fully consider land quality in the decision making process.

Does Natural England carry out ALC surveys?
Natural England provides advice to Local Planning Authorities on ALC matters, but does not carry out ALC field surveys. Natural England holds copies of detailed individual Agricultural Land Classification (ALC) surveys carried out by the former Ministry of Agriculture, Fisheries and Food until the late 1990s. These surveys were undertaken largely in response to requests from Local Planning Authorities for individual sites or areas at the urban edge which were to be considered for development; not all agricultural land was surveyed at the time. There is no longer a national programme to survey all areas in detail and since the late the 1990's, the Government no longer undertakes detailed field surveys itself. Specialist consultants are engaged by developers, Local Planning Authorities, landowners and others

to carry out detailed Agricultural land Classification surveys for local plans and other development proposals.

What sampling density should I use in my ALC field survey?
There is no prescribed guidance on the sample density of field surveys; however, most experienced ALC surveyors use an average density of 1 sample point per hectare (carried out on the Ordinance Survey 100m grid). Soil pits are also useful to obtain further information about soil structure, porosity and stone content, rock layers etc. to enable confirmation of the grading found on site. The number of soil pits is difficult to specify in advance of starting field survey work. In general, one soil pit is dug for each of the main grades or soil types on the site, though not necessarily for each map unit, but it should be left to the professional judgement of the surveyor as to the appropriate minimum number required.

Surveys at this detailed level can also enable an assessment of the soil resources in line with the Defra Code of Practice for the Sustainable Use of Soils on Construction Sites and will allow users to present the land quality case to public inquiry level if required.

Depending upon the type of development, location, scale, purpose of the survey, availability of existing ALC data etc., less detailed surveys (or sometimes more detailed) surveys may be undertaken, but expert advice must be sought from a soil scientist or other practitioner experienced in undertaking ALC survey work. All data captured in ALC surveys is done to the same standard (i.e. standard recording of soil colour, texture etc. plus pits). The only difference in a less detailed survey is the grid spacing, not the quality or detail of data capture at the points examined.

It is important that ALC surveys are completed by an experienced ALC surveyor to ensure that the evidence is accurate and robust to inform planning decisions. The British Society of Soil Scientists run training courses and has a competency scheme, ***Working with Soil***, covering aspects of soil survey and the ALC system.

What climate data is used for ALC?

The definitive climatic data used for assessing the overall climatic limitation (and for the wetness and droughtiness limitations) are obtained from a series of grid point datasets compiled specifically for ALC (Meteorological Office 1989: Climatological Data for Agricultural Land Classification). They provide long term average values of the required variables on a 5km grid covering the whole of England and Wales. These variables are interpolated for the location (grid reference) and altitude for intermediate sites.

I am a consultant/soil scientist undertaking a detailed ALC site survey and the land benefits from irrigation. Should I be taking this into account in my grading assessment?
No. The advice that irrigation should be removed from the ALC assessment was expressed in a consultation on the ALC system in 1996.

APPENDIX 1: AGRICULTURAL LAND CLASSIFICATION (ALC)

Descriptions of the Grades and Subgrades

The ALC grades and subgrades are described below in terms of the types of limitation which can occur, typical cropping range and the expected level and consistency of yield. In practice, the grades are defined by reference to physical characteristics. The grading guidance and cut-offs for limitation factors in the MAFF (1988) Agricultural Land Classification of England and Wales Revised Guidelines and Criteria for Grading the Quality of Agricultural Land enable land to be ranked in accordance with these general descriptions.

Descriptions are also given of other land categories which may be used on ALC maps.

Grade 1: Excellent Quality Agricultural Land

Land with no or very minor limitations to agricultural use. A very wide range of agricultural and horticultural crops can be grown and commonly includes top fruit, soft fruit, salad crops and winter harvested vegetables. Yields are high and less variable than on land of lower quality.

Grade 2: Very Good Quality Agricultural Land

Land with minor limitations which affect crop yield, cultivations or harvesting. A wide range of agricultural or horticultural crops can usually be grown but on some land of this grade there may be reduced flexibility due to difficulties with the production of the more demanding crops such as winter harvested vegetables and arable root crops. The level of yield is generally high but may be lower or more variable than Grade 1 land.

Grade 3: Good to Moderate Quality Land

Land with moderate limitations which affect the choice of crops, the timing and type of cultivation, harvesting or the level of yield. When more demanding crops are grown, yields are generally lower or more variable than on land in Grades 1 and 2.

Subgrade 3a: Good Quality Agricultural Land

> Land capable of consistently producing moderate to high yields of a narrow range of arable crops, especially cereals, or moderate yields of a wide range of crops including cereals, grass, oilseed rape, potatoes, sugar beet and the less demanding horticultural crops.

Subgrade 3b: Moderate Quality Agricultural Land

> Land capable of producing moderate yields of a narrow range of crops, principally cereals and grass, or lower yields of a wider range of crops or high yields of grass which can be grazed or harvested over most of the year.

Grade 4: Poor Quality Agricultural Land

Land with severe limitations which significantly restrict the range of crops and/or the level of yields. It is mainly suited to grass with occasional arable crops (e.g. cereals and forage crops) the yields of which are variable. In moist climates, yields of grass may be moderate to high but there may be difficulties in utilisation. The grade also includes very droughty arable land.

Grade 5: Very Poor Quality Agricultural Land

Land with severe limitations which restrict use to permanent pasture or rough grazing, except for occasional pioneer forage crops.

Descriptions of other land categories used on ALC maps

Urban
Built-up or 'hard' uses with relatively little potential for a return to agriculture including: housing, industry, commerce, education, transport, religious buildings, cemeteries. Also, hard-surfaced sports facilities, permanent caravan sites and vacant land; all types of derelict land, including mineral workings which are only likely to be reclaimed using derelict land grants.

Non-agricultural
'Soft' uses where most of the land could be returned relatively easily to agriculture, including: golf courses, private parkland, public open spaces, sports fields, allotments and soft-surfaced areas on airports/ airfields. Also active mineral workings and refuse tips where restoration conditions to 'soft' after-uses may apply.

Woodland
Includes commercial and non-commercial woodland. A distinction may be made as necessary between farm and non-farm woodland. Includes the normal range of agricultural buildings as well as other relatively permanent structures such as glasshouses. Temporary structures (e.g. polythene tunnels erected for lambing) may be ignored.

Open water
Includes lakes, ponds and rivers as map scale permits.

Land not surveyed
Agricultural land which has not been surveyed. Where the land use includes more than one of the above land cover types, e.g. buildings in large grounds, and where map scale permits, the cover types may be shown separately. Otherwise, the most extensive cover type will usually be shown.

Source: Section 2: MAFF (1988) Agricultural Land Classification of England and Wales Revised Guidelines and Criteria for Grading the Quality of Agricultural Land.

APPENDIX KCC2

Pre-application Consultation Response from Welsh Government

From: Arwel.Williams@gov.wales <Arwel.Williams@gov.wales> **On Behalf Of** LQAS@gov.wales
Sent: 30 September 2022 13:17
To: Archie Roberts <Archie.Roberts@pegasusgroup.co.uk>
Cc: Gareth Roberts <gareth.roberts@pegasusgroup.co.uk>
Subject: RE: Parc Solar Caenewydd, Gowerton, Swansea - Request for Informal Pre-Application Advice

Dear Archie Roberts,

Re: Proposed Parc Solar Caenewydd, Gowerton, Swansea - Request for Pre-Application Advice.

Thank your for request for pre-application advice in respect of the above proposed development. This advice relates to technical information only on agricultural land quality; not the merits or otherwise of the proposal (TAN6, Annex B6).

1. Agricultural Land Classification (ALC) – information.

The Department does not hold any detailed ALC field survey information for the proposed site (see attached map of proposed 'red-line' boundary). The Predictive ALC Map (2019) notes the proposed site as mainly subgrade 3b with an area grade 5 present.

2. Agricultural Land Classification (ALC) – advice.

As per the flowchart on page 2 of the published guidance, if the site does not contain Predicted (or previously field surveyed) BMV agricultural land, a detailed filed survey is not required and the Predictive Map grades can be taken as best available information. A detailed ALC field survey is not recommended for the site. The Department does not consider BMV land to be present at this site and therefore Planning Policy Wales paragraph 3.58 and 3.59 would not apply.

If you require any further information, please do get in touch.

I would be grateful if all future consultation requests are sent directly to our mailbox LQAS@gov.wales.

Regards

Arwel Williams

Arwel Wyn Williams
Cynghorydd Polisi Pridd a Defnydd Tir Amaethyddol / Agricultural Land Use & Soil Policy Advisor
Is-adran Tirweddau, Natur a Choedwigaeth / Landscapes, Nature and Forestry Division
Llywodraeth Cymru / Welsh Government
Ffôn / Tel: 0300 025 2052
E-bost: arwel.williams@llyw.cymru / E-mail: arwel.williams@gov.wales
Ar y We / Internet: www.llyw.cymru / www.gov.wales

APPENDIX KCC3

Photos of Farm Shop Products

FARM SHOP (all taken from Facebook pages)

APPENDIX KCC4

Excerpts from Pre-application Consultation Response

CITY & COUNTY OF SWANSEA / DINAS A SIR ABERTAWE
DIRECTORATE OF PLACE / CYFARWYDDIAETH LLEOEDD
PLANNING AND CITY REGENERATION / CYNLLUNIO AC ADFYWIO'R DDINAS
CIVIC CENTRE, OYSTERMOUTH ROAD, SWANSEA, SA1 3SN
Y GANOLFAN DDINESIG, HEOL YSTUMLLWYNARTH, ABERTAWE, SA1 3SN
☎ (01792) 635701 (01792) 635719 (01792) 635708
planning@swansea.gov.uk / http://www.swansea.gov.uk

Gareth Roberts
Pegasus Group
First Floor South Wing
Equinox North
Great Park Road
Almondsbury
Bristol
BS32 4QL

Please ask for: Lucy Kelly
Direct Line: 07970 680533
E-mail: lucy.kelly@swansea.gov.uk
Date: 22/11/2022

Dear Sir/Madam

The Town and Country Planning Act 1990 (As amended)
The Town and Country Planning (Pre-Application Services)(Wales) Regulations 2016

Application No: 2022/2298/PRE
Site Location: Parc Solar Caenewydd Swansea Road Gorseinon Swansea SA4 4LE
Proposal: CONFIDENTIAL PRE APP for a Development of National Significance for a solar farm

I refer to the above pre-application received on 28 September 2022 seeking advice under the statutory pre-application services provided for under the above Regulations.

The Proposal

Development of National Significance for a solar farm.

Relevant planning history

None relevant

Development Plan and Relevant Policies

Local Development Plan Policies

The Development Plan for the area is the Swansea Local Development Plan (2010-2025) (Adopted February 2019). The following LDP policies are considered to be relevant to your proposal:

PS 1 Sustainable Places – the delivery of new homes, jobs, infrastructure and community facilities must comply with the plan's sustainable settlement strategy which; directs to the most sustainable locations within defined settlement boundaries of the urban area and Key villages; requires compliance with Sustainable Housing Strategy (PS 3) and Sustainable Employment Strategy (PS 4); safeguards Green Wedges; and resists development in the open Countryside.

PS 2 Placemaking and Place Management – development should enhance the quality of places and spaces and should accord with relevant placemaking principles.

To receive this information in alternative format, please contact the above.
I dderbyn yr wybodaeth hon mewn fformatt arall, cysylltwch a'r person uchod.

CITY & COUNTY OF SWANSEA / DINAS A SIR ABERTAWE
DIRECTORATE OF PLACE / CYFARWYDDIAETH LLEOEDD
PLANNING AND CITY REGENERATION / CYNLLUNIO AC ADFYWIO'R DDINAS
CIVIC CENTRE, OYSTERMOUTH ROAD, SWANSEA, SA1 3SN
Y GANOLFAN DDINESIG, HEOL YSTUMLLWYNARTH, ABERTAWE, SA1 3SN
☎ (01792) 635701 (01792) 635719 (01792) 635708
planning@swansea.gov.uk / http://www.swansea.gov.uk

Further details on how to apply and guidance can be obtained from the website https://www.swansea.gov.uk/sustainabledrainage and by contacting the SuDS Approval Body via email Sab@swansea.gov.uk

Pollution Control

The Pollution Control officer has confirmed that they raise no objection to the proposal, and advised that they await the further investigation as advised within the submitted Draft Phase 1 Geoenvironmental Report and Coal mining Risk Assessment

Other Key Issues

Minerals Safeguarding Areas:

Part of the proposed developable area lies within a mineral safeguarding area (see Proposals Map). However, solar panels are considered to be temporary development, therefore in accordance with Policy RP13, such development will only be permitted where it can be demonstrated that the proposal will be implemented, and the site restored within a timescale that the mineral is likely to be needed.

Best and Most Versatile Agricultural land (BMV):

PPW paras 3.58 and 3.59 outlines national policy towards conserving Wales Best and Most Versatile (BMV) Agricultural land. Best and most versatile agricultural land is defined in PPW as Agricultural land of Grades 1, 2 and 3a. PPW states that agricultural land of grades 1,2 and 3a is the best and most versatile and should be conserved as a finite resource for the future and it should only be developed if there is an overriding need for the development and either previously developed land or land in lower agricultural grades is unavailable or available lower grade land has an environmental value recognised by a landscape, wildlife, historic or archaeological designation which outweighs the agricultural consideration.

As indicated in the Welsh Government's Predicted Agricultural Land Classification (ALC) Map 2, grades of the land within the site area as predominantly 3b with areas of Grade 5. The site is also not adjacent to agricultural land of grades 1,2 or 3a which may then require an assessment to confirm the exact status. As the proposal would not result in the loss of BMV land, in line with the supporting technical note (Predictive Agricultural Land Classification Map Wales Guidance note) where the map shows land as grades 3b, 4 or 5 a survey is not required. Accordingly, the proposal would not be contrary to national planning policy and LDP Policy PS 2xii in respect of impact on BMV Agricultural land.

Common Land

The records of registered common land have been checked and it is confirmed that part of the land (alongside Swansea Road prior to Glasfryn Terrace) of the application site does abut CL:044 Mynydd Garngoch Common but does not form part of common land.

To receive this information in alternative format, please contact the above.
I dderbyn yr wybodaeth hon mewn fformatt arall, cysylltwch a'r person uchod.

APPENDIX KCC5

Outline Soil Management Plan

PARC SOLAR CAENEWYDD

OUTLINE SOIL MANAGEMENT PLAN

December 2023

Authorised By APK 12/23

Greenacres Barn, Stoke Common Lane, Purton Stoke, Swindon SN5 4LL
T: 01793 771333 Email: info@kernon.co.uk Website: www.kernon.co.uk

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*Directors - **Tony Kernon** BSc(Hons), MRAC,, MRICS, FBIAC **Sarah Kernon***
*Consultant – **Ellie Chew** BSc(Hons), **Amy Curtis** BSc(Hons)*

1 OUTLINE SOIL MANAGEMENT PLAN

1 This document provides an Outline Soil Management Plan (oSMP) for the Parc Solar Caenewydd Solar Farm project (hereafter referred to as 'the Proposed Development').

2 The objective of the oSMP is to identify the importance and sensitivity of the soil resource and to provide specific guidance to ensure that there is no significant adverse effect on the soil resource as a result of the Proposed Development.

3 This oSMP draws on professional experience with the installation of solar panels. It also draws on experience with the installation of underground services (especially pipelines), and with soil movement and restoration of agricultural land in connection with roads, quarries and golf courses.

Overview of Key Principles

4 For much of the installation process there is no requirement to move or disturb soils. Soils will need to be moved and disturbed to create temporary working compounds, and to create the tracks and small fixed infrastructure bases. Soils will need to be disturbed to enable cables to be laid, but the soils will be reinserted shortly after they are lifted out (ie this is a swift process). An area of land will need to be levelled to provide a base for the battery storage.

5 For the majority of the proposed development soils do not need to be disturbed. The effects on agricultural land quality and soil structure are therefore limited to the effects of vehicle passage. This is agricultural land, so it is already subject to regular vehicle passage. Therefore the key consideration is to ensure that soils are passed over by vehicles (trafficked) when the soils are in a suitable condition, and that if any localised damage or compaction occurs (which is common with normal farming operations too), it is ameliorated suitably.

6 The key principles for successfully avoiding damage to soils are:

- timing;
- retaining soil profiles;
- avoiding compaction;
- ameliorating compaction; and
- storing soils for subsequent reuse.

Timing

7 The most important management decision/action to avoid adverse effects on soils is the timing of works. If the construction work takes place when soil conditions are sufficiently dry, then damage from vehicle trafficking and trenching will be minimal.

8 The soils are generally resilient, and any damage from vehicle trafficking can generally be made good by mechanical husbandry once the soils start to dry in the spring.

9 Between early November and late March there is an increased risk of creating localised damage to soil structure from vehicle passage. There are obviously a great number of variables, such as recent rainfall pattern, whether the ground is frozen or has standing water, inevitable variations in soil condition across single fields, and the size and type of machinery driving onto the land. However landwork in this period is most likely to result in the need for restorative works post installation.

10 The Welsh weather being what it is, there is potential for variation. A dry late winter and early spring, for example, will result in different conditions to a very wet February and March.

11 As a general rule any activity that requires soil to be dug up and moved, such as cabling works, should be minimised during that period. Soils handled when wet tend to lose some of their structure, and this results in them taking longer to recover after movement, and potentially needing restorative works (eg ripping with tines) to speed recovery of damaged soil structure.

12 In localised instances where it is not possible to avoid undertaking construction activities when soils are wet and topsoil damage occurs then soils can be recovered by normal agricultural management, using normal agricultural cultivation equipment (subsoiler, harrows, power harrows etc) once soils have dried adequately for this to take place. There may be localised wet areas in otherwise dry fields, for example, which are difficult to avoid.

Retaining Soil Profiles

13 The successful installation of cabling at depths of 60-80cm requires a trench to be dug into the ground. The coverage of topsoil is generally 30cm, with subsoils below that being generally similar to depth. As set out in the BRE Agricultural Good Practice Guidance for Solar Farms (extract at **Attachment A**) at page 3:

> "**When excavating cable trenches, storing and replacing topsoil and subsoil separately and in the right order is important to avoid long-term unsightly impacts on soil and vegetation structure. Good practice at this stage will yield longer-term benefits in terms of productivity and optimal grazing conditions**".

14 In those areas where the soil is dug up (trenching and for compounds and access roads), the soils should be returned in as close to the same order, and in similar profiles, as it was removed.

Avoiding Compaction

15 This oSMP sets out when soils should generally be suitable for being trafficked. There may be periods within this window, however, when periodic rainfall events result in soils becoming liable to damage from being trafficked or worked. In these (likely rare) situations, work should only continue with care, to minimise structural effects on the soils, until soils have dried, usually within 48 hours of heavy rain stopping.

16 Run-off from the land from heavy rain through the construction period is unlikely to result in water leaving the site even in extreme events, because there will be wide buffers of land around the edges of the panels.

17 If conditions have been challenging, the operators will take measures to divert any run-off (eg down open trenches) from leaving the site.

Ameliorating Compaction

18 If localised compaction occurs during construction, it should be ameliorated. This can normally be achieved with standard agricultural cultivation equipment, such as subsoilers (if required), power harrows and rolls.

19 The amount of restorative work will vary depending upon the localised impact. Consequently where the surface has become muddy, for example in the photograph below, this can be recovered once the soil has dried, with a tine harrow and, as needed, a roller or crumbler bar.

Inserts 1 and 2: Inter-row Ground Restoration

20 The type of machinery involved is shown below. This shows farming and horticultural versions.

Inserts 3 – 6: Type of Machinery Involved

21 If there are any areas where there has been localised damage to the soils due to vehicle passage, for example, a low wet area within a field which despite best efforts could not be avoided, this should be made good and reseeded at the end of the installation stage. This is not uncommon: most farmers will have times when they have to travel around the farm in a tractor in conditions where the tyres make deep impacts. This can happen during harvest time, for example, especially of late crops or in very wet harvest seasons. Whilst this is avoided so far as possible, it occurs and the effects are made good when conditions are suitable.

22 With these soils, which are slowly permeable soils, these areas will readily restore once the soils are sufficiently dry. The ruts need to be harrowed level when the ground is dry.

23 Accordingly the ground surface should be generally levelled prior to any seeding or reseeding.

Soil Management for Moving Soils (Stripping)

24 Soil should ideally be stripped in layers when the soil is sufficiently dry and does not smear. This is a judgement that is easily made. If the soils can be rolled into a sausage shape in the hand which is not crumbly, or if rubbing a thumb across the surface causes a smudged smooth surface (a smear), the soil is generally too wet to strip or move without risk of structural damage. Topsoil depths vary but a stripping depth of 20-30cm will be a suitable maximum depth for topsoil in most cases, although rarely will it need to be stripped to such a depth.

25 Soil stripping should be carried out in accordance with Defra "Construction Code of Practice for the Sustainable Use of Soils on Construction Sites" (Defra, 2009).

26 The removed soil should be stored in bunds in accordance with the Construction Code of Practice, as set out in **Attachment B**.

27 The construction of tracks involves the movement of soils. Therefore the soils are more susceptible to damage from mechanical moving. The topsoil will, however, be stored for the duration of the operational period. Accordingly if for operational reasons it is necessary to commence the construction of tracks and bases when soils are not in optimal condition, the soil to be stored should be stored initially in bunds of maximum 1 metre high.

28 This will allow the soils to dry. Shallow bunds can then be moved again once they are dry into larger bunds for long-term storage.

29 Once the soils are sufficiently dry, typically from April, it will be possible to move the soils straight to long-term storage bunds.

30 As a general rule soil should not be moved during or within 24 hours of heavy rain.

31 Further information can be obtained as follows:

- MAFF “Good Practice Guide for Handling Soils”, 2000;
- Institute of Quarrying “Good Practice Guide for Handling Soils in Mineral Workings”, 2021;
- BRE “Agricultural Good Practice For Solar Farms”, 2014.

Soil Management (Trafficking)

32 Installation of panels should take place so far as possible when soil conditions are suitable (ie the soil is not so wet that vehicles cause tyre marks, such as shown below, deeper than about 10cm when travelling across the land).

Insert 7: Track Marks

33 It is very unlikely that trafficking during construction when soils are relatively dry will result in compaction sufficient to require amelioration. However, if rutting has resulted the soil should be levelled by standard agricultural cultivation equipment such as tine harrows, once the conditions suit, and prior to seeding. This can be done with standard agricultural machinery, or with small horticultural-grade machinery such as is shown below.

Inserts 8 and 9: Horticultural Machinery

34 The objective is to get the surface to a level tilth for seeding/reseeding as necessary, as was shown earlier.

35 Grass growth will then recover or establish rapidly.

36 If for operational reasons trafficking of soils does cause surface damage, that can be restored. It is also unlikely to result in any structural damage long term. The photo below shows soil damage during construction. It is followed by the same view in the subsequent photo from seven years later. We have reviewed the soils and there has been no long-term soil damage or ALC downgrading.

Inserts 10 and 11: Winter Installation (2015) and Operational Site (2022)

37 Where there is surface damage at this level, there may be a need for shallow subsoiling to be carried out the following spring, prior to surface cultivation and seeding.

Soil Management (Trenching)

38 All trenching work will be carried out when the topsoil is dry and not plastic (ie it can be moulded into shapes in the hand).

39 The top 30cm will be dug off and placed on one side of the trench, for subsequent restoration. There is no need to strip the grass first.

40 The subsoils will then be dug out and placed on the other side of the trench, as per the example below.

Insert 12: Subsoils Dug out of the Trench

41 Once the cable has been laid, the subsoils will be placed back in the trench. Where there is a clear colour difference within the subsoils, so far as practicable the lower subsoil will be put back first and the upper subsoil above that, which is likely to happen anyway as the lower soil is at the top of the pile.

42 If dry and lumpy the subsoils will be pressed down by the bucket to speed settlement. If the soils are settling well no pressing-down is required.

43 The topsoil will then be returned onto the top of the trench. It is likely, and right, that the topsoil will sit 5-10cm higher than the surrounding level. This should be left to allow it to settle naturally as the soils become wetter.

44 If there is a surplus of topsoil this may be because the lower subsoils were dry and blocky and there are considerable gaps in the soil. These will naturally restore once the lower soils become wet again. If the trench backfilling will result in the soil being more than 5-10cm proud of surrounding levels, which is unlikely but possible, the topsoil should not be piled higher. It should be left to the side, and the digger would return once the trench has settled and add the rest of the topsoil onto the trench at that point.

45 Any excess topsoil should not be piled higher than 5 – 10cm above ground level.

46 If considered appropriate, a suitable grass seed mix could be spread by hand over any parts of the trenches that would seem likely to benefit from extra grass.

Attachment A

Agricultural Good Practice Guidance for Solar Farms (2013)

bre

www.bre.co.uk/nsc

Agricultural Good Practice Guidance for Solar Farms

NFU

EUROPEAN UNION
Investing in Your Future

European Regional Development Fund 2007-2013

BRE NATIONAL SOLAR CENTRE

Principal Author and Editor Dr Jonathan Scurlock, National Farmers Union

This document should be cited as: BRE (2014) Agricultural Good Practice Guidance for Solar Farms. Ed J Scurlock

BRE National Solar Centre would like to sincerely thank colleagues from the following organisations who have made significant contributions to the development of this guidance:

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With thanks to NSC Founding Partners:

Context

This document describes experience and principles of good practice to date for the management of small livestock in solar farms established on agricultural land, derelict/marginal land and previously-developed land.

Proposed for publication as an appendix to existing best practice guidelines by the BRE National Solar Centre[1], it should be read in conjunction with BRE (2014) Biodiversity Guidance for Solar Developments (eds. G.E. Parker and L. Greene).

The guidance presented here has been developed with, and endorsed by, a number of leading UK solar farm developers and organisations concerned with agriculture and land management.

Introduction

Field-scale arrays of ground-mounted PV modules, or "solar farms", are a relatively recent development, seen in Britain only since 2011, although they have been deployed in Germany and other European countries since around 2005. In accordance with the "10 Commitments" of good practice established by the Solar Trade Association[2], the majority of solar farm developers actively encourage multi-purpose land use, through continued agricultural activity or agri-environmental measures that support biodiversity, yielding both economic and ecological benefits.

It is commonly proposed in planning applications for solar farms that the land between and underneath the rows of PV modules should be available for grazing of small livestock. Larger farm animals such as horses and cattle are considered unsuitable since they have the weight and strength to dislodge standard mounting systems, while pigs or goats may cause damage to cabling, but sheep and free-ranging poultry have already been successfully employed to manage grassland in solar farms while demonstrating dual-purpose land use.

Opportunities for cutting hay or silage, or strip cropping of high-value vegetables or non-food crops such as lavender, are thought to be fairly limited and would need careful layout with regard to the proposed size of machinery and its required turning space. However, other productive options such as bee-keeping have already been demonstrated. In some cases, solar farms may actually enhance the agricultural value of land, where marginal or previously-developed land (e.g. an old airfield site) has been brought back into more productive grazing management. It is desirable that the terms of a solar farm agreement should include a grazing plan that ensures the continuation of access to the land by the farmer, ideally in a form that that enables the claiming of Basic Payment Scheme agricultural support (see page 2).

[1] BRE (2013) Planning guidance for the development of large scale ground mounted solar PV systems. www.bre.co.uk/nsc

[2] STA "Solar Farms: 10 Commitments" http://www.solar-trade.org.uk/solarFarms.cfm

Conservation grazing for biodiversity

As suggested in the Biodiversity Guidance described above, low intensity grazing can provide a cost-effective way of managing grassland in solar farms while increasing its conservation value, as long as some structural diversity is maintained. A qualified ecologist could assist with the development of a conservation grazing regime that is suited to the site's characteristics and management objectives, for incorporation into the biodiversity management plan.

Avoiding grazing in either the spring or summer will favour early or late flowering species, respectively, allowing the development of nectar and seeds while benefiting invertebrates, ground nesting birds and small mammals. Hardy livestock breeds are better suited to such autumn and winter grazing, when the forage is less nutritious and the principal aim is to prevent vegetation from overshadowing the leading (lower) edges of the PV modules (typically about 800-900mm high). Other habitat enhancements may be confined to non-grazed field margins (if provision is made for electric or temporary fencing) as well as hedgerows and selected field corners.

Agricultural grazing for maximum production

The developer, landowner and/or agricultural tenant/licensee may choose to graze livestock at higher stocking densities throughout the year over much of the solar farm, especially where the previous land use suggested higher yields or pasture quality. Between 4 and 8 sheep/hectare may be achievable (or 2-3 sheep/ha on newly-established pasture), similar to stocking rates on conventional grassland, i.e. between about March and November in the southwest and May to October in North-East England.

The most common practice is likely to be the use of solar farms as part of a grazing plan for fattening/finishing of young hill-bred 'store' lambs for sale to market. Store lambs are those newly-weaned animals that have not yet put on enough weight for slaughter, often sold by hill farmers in the Autumn for finishing in the lowlands. Some hardier breeds of sheep may be able to produce and rear lambs successfully under the shelter of solar farms, but there is little experience of this yet. Pasture management interventions such as 'topping' (mowing) may be required occasionally or in certain areas, in order to avoid grass getting into unsuitable condition for the sheep (e.g. too long, or starting to set seed).

Smaller solar parks can provide a light/shade environment for free-ranging poultry (this is now recognised by the RSPCA Freedom Foods certification scheme) – experience to date suggests there is little risk of roosting birds fouling the modules. Broiler (meat) chickens, laying hens and geese will all keep the grass down, and flocks may need to be rotated to allow recovery of vegetation. Stocking density of up to 2000 birds per hectare is allowed, so a 5 megawatt solar farm on 12 hectares would provide ranging for 24,000 birds.

Solar farm design and layout

In most solar farms, the PV modules are mounted on metal frames anchored by driven or screw piles, causing minimal ground disturbance and occupying less than 1% of the land area. The rest of the infrastructure typically disturbs less than 5% of the ground, and some 25-40% of the ground surface is over-sailed by the modules or panel. Therefore 95% of a field utilised for solar farm development is still accessible for vegetation growth, and can support agricultural activity as well as wildlife, for a lifespan of typically 25 years.

As described above, the layout of rows of modules and the width of field margins should anticipate future maintenance costs, taking into account the size, reach and turning circle of machinery and equipment that might be used for 'topping' (mowing), collecting forage grass, spot-weeding (e.g. of 'injurious' weeds like ragwort and dock) and re-seeding. Again, in anticipation of reverting the field to its original use after 25 years, many agri-environmental measures may be better located around field margins and/or where specifically recommended by local ecologists. All European farmers are obliged to maintain land in "good agricultural and environmental condition" under the Common Agricultural Policy rules of 'cross compliance', so it is important to demonstrate sound stewardship of the land for the lifetime of a solar farm project, from initial design to eventual remediation.

The depth of buried cables, armouring of rising cables, and securing of loose wires on the backs of modules all need to be taken into consideration where agricultural machinery and livestock will be present. Cables need to be buried according to national regulations and local DNO requirements, deep enough to avoid the risk of being disturbed by farming practice – for example, disc harrowing and re-seeding may till the soil to a depth of typically 100-150 mm, or a maximum of 200 mm. British Standard BS 7671 ("Wiring Regulations") describes the principles of appropriate depth for buried cables, cable conduits and cable trench marking. Note also that stony land may present a risk of stone-throw where inappropriate grass management machinery is used (e.g. unguarded cylinder mowers).

Eligibility for CAP support and greening measures

From 2015, under the Common Agricultural Policy, farmers will be applying for the new Basic Payment Scheme (BPS) of area-based farm support funding. It has been proposed that the presence of sheep grazing could be accepted as proof that the land is available for agriculture, and therefore eligible to receive BPS, but final details are still awaited from Defra at the time of writing. Farmers must have the land "at their disposal" in order to claim BPS, and solar farm agreements should be carefully drafted in order to demonstrate this (BPS cannot be claimed if the land is actually rented out). Ineligible land taken up by mountings and hard standing should be deducted from BPS claims, and in the year of construction larger areas may be temporarily ineligible if they are not available for agriculture.

Defra has not yet provided full details on BPS 'greening' measures, but some types of Ecological Focus Areas may be possibly located within solar farms, probably around the margins, including grazed buffer strips and ungrazed fallow land, both sown with wildflowers. Note that where the agreed biodiversity management plan excludes all forms of grazing, the land will become ineligible for BPS, and this may have further implications for the landowner, such as for inheritance tax.

Long-term management, permanent grassland and SSSI designation

Since solar farms are likely to be in place typically for 25 years, the land could pass on to a succeeding generation of farmers or new owners, and the vegetation and habitat within the fenced area is expected to gradually change with time. According to Natural England, there is little additional risk that the flora and fauna would assume such quality and interest that the solar farm might be designated a SSSI (Site of Special Scientific Interest) compared with a similarly-managed open field. However, there could be a possible conflict with planning conditions to return the land to its original use at the end of the project, e.g. if this is specified as 'cropland' rather than more generically as 'for agricultural purposes'. If the pasture within a solar farm were considered to have become a permanent grassland, it may be subject to regulations requiring an Environmental Impact Assessment to restore the original land use, although restoration clauses in the original planning consent may take precedence here. It is proposed that temporary (arable) grassland should be established on the majority of the land area that lies between the rows of modules. This would be managed in 'improved' condition by periodic harrowing and re-seeding (e.g. every 5 years), typically using a combination disc harrow and seed drill.

Other measures to maintain the productivity of grassland, without the need for mechanised cultivations or total reseeding, could include: maintaining optimum soil fertility and pH to encourage productive grass species; seasonally variable stocking rates to prevent over/under-grazing with the aim of preventing grass from seeding and becoming unpalatable. Non-tillage techniques to optimise grass sward content might include the use of a sward/grass harrow and air-seeder to revive tired pastures. When applying soil conditioners (e.g. lime), fertilisers or other products, consideration should be taken to prevent damage to or soiling of the solar modules.

Good practice in construction and neighbourliness

Consideration should also be given to best practice during construction and installation, and ensuring that the future agricultural management of the land (such as a change from arable cropping to lamb production) fits into the local rural economy. Site access should follow strictly the proposed traffic management plan, and careful attention to flood and mud management in accordance with the Flood Risk Assessment (e.g. controlling run-off by disrupting drainage along wheelings), will also ensure that the landowner remains on good terms with his/her neighbours.

Time of year should be taken into account for agricultural and biodiversity operations such as prior seeding of pasture grasses and wildflowers. Contractors should consider avoiding soil compaction and damage to land drains, e.g. by using low ground pressure tyres or tracked vehicles. Likewise, when excavating cable trenches, storing and replacing topsoil and subsoil separately and in the right order is important to avoid long-term unsightly impacts on soil and vegetation structure. Good practice at this stage will yield longer-term benefits in terms of productivity and optimal grazing conditions.

Evidence base and suggested research needs

A number of preliminary studies on the quantity and quality of forage available in solar farms have suggested that overall production is very little different from open grassland under similar conditions. A more comprehensive and independent evidence base could be established through a programme of directed research, e.g. by consultants (such as ADAS) or interested university groups (e.g. Exeter University departments of geography and biosciences), perhaps in association with seed suppliers and other stakeholders. Productivity of grasses could be compared between partial shade beneath the solar modules and unshaded areas between the rows. Alternatively daily live weight gain could be compared between two groups of fattening lambs (both under the same husbandry regime) on similar blocks of land, with and without solar modules present.

Case Steiger Quadtrac used to deliver inverters and other heavy equipment to site under soft ground conditions (photo courtesy of British Solar Renewables)

Cable trenching, showing topsoil stripped and set to one side, with subsoil placed on the other side ready for reinstatement (photo courtesy of British Solar Renewables)

Agricultural case studies

Benbole Farm, Wadebridge, Cornwall

One of the first solar farms developed in Britain in 2011, this 1.74 megawatt installation on a four-hectare site is well screened by high hedges and grazed by a flock of more than 20 geese. A community scheme implemented by the solar farm developers enabled local residents to benefit from free domestic solar panels and other green energy projects.

Higher Hill, Butleigh, Somerset

Angus Macdonald, a third-generation farmer, installed a five megawatt solar farm on his own land. Located near Glastonbury, the site has been grazed by sheep since its inception in 2011.

Eastacombe Farm, Holsworthy, Devon

This farm has been in the Petherick family for four generations, but they were struggling to survive with a small dairy herd. In 2011/12, a solar developer helped them convert eight hectares of the lower-grade part of their land into a 3.6 megawatt solar farm with sheep grazing, which has diversified the business, guaranteeing its future for the next generation of farmers.

Newlands Farm, Axminster, Devon

Devon sheep farmer Gilbert Churchill chose to supplement his agricultural enterprise by leasing 13 hectares of grazing land for a 4.2 megawatt solar PV development, which was completed in early 2013. According to Mr Churchill, the additional income stream is "a lifeline" that "will safeguard the farm's survival for the future".

Trevemper Farm, Newquay, Cornwall

In 2011, the Trewithen Estate worked with a solar developer to build a 1.7 megawatt solar farm on 6 hectares of this south-facing block of land, which had good proximity to a grid connection. During the 25-year lease, the resident tenant farmer is still able to graze the land with sheep at his normal stocking density, and is also paid an annual fee to manage the pasture.

Yeowood Solar Farm, North Somerset

Completed in 2012, this 1.3 megawatt installation on 4 hectares of land surrounds a poultry farm of 24,000 laying hens, which are free to roam the land between and underneath the rows of solar modules, as well as other fields. The Ford family, farm owners, also grow the energy crop miscanthus to heat their eco-friendly public swimming pool and office units.

Wyld Meadow Farm, Bridport, Dorset

Farmers Clive and Jo Sage continue to graze their own-brand Poll Dorset sheep on this 4.8 megawatt solar farm, established on 11 hectares in 2012. The solar farm was designed to have very low visual impact locally, with an agreement to ensure livestock grazing throughout the project's lifetime.

Wymeswold Solar Farm, Leicestershire

The author pictured in July 2014 at Britain's largest connected solar farm. At 33 megawatts, this development provides enough energy to power 8,500 homes. Built on a disused airfield in 2013, this extensive installation over 61 hectares (150 acres) received no objections during planning and is grazed by the landowner's sheep – just visible in the background.

BRE National Solar Centre
Foundation Building, Eden Project,
Bodelva, St Blazey
PL24 2SG

T +44 (0)1726 871830
E nsc@bre.co.uk
www.bre.co.uk/nsc
Twitter @natsolarcentre

BRE Trust
The BRE Trust uses profits made by BRE Group to fund new research and education programmes, that will help it meet its goal of 'building a better world together'.

Attachment B

Extracts Construction Code of Practice

www.defra.gov.uk

Construction Code of Practice for the Sustainable Use of Soils on Construction Sites

BIS | Department for Business Innovation & Skills

wrap Material change for a better environment

defra Department for Environment Food and Rural Affairs

5.4 Soil stockpiling

Why?

1. Soil often has to be stripped or excavated during the construction process. In order to enable its reuse on site at a later stage, soil needs to be stored in temporary stockpiles to minimise the surface area occupied, and to prevent damage from the weather and other construction activities.

How?

2. The main aim when temporarily storing soil in stockpiles is to maintain soil quality and minimise damage to the soil's physical (structural) condition so that it can be easily reinstated once respread. In addition, stockpiling soil should not cause soil erosion, pollution to watercourses or increase flooding risk to the surrounding area.

3. When soil is stored for longer than a few weeks, the soil in the core of the stockpile becomes anaerobic and certain temporary chemical and biological changes take place. These changes are usually reversed when the soil is respread to normal depths. However, the time it takes for these changes to occur very much depends on the physical condition of the soil.

4. Handling soil to create stockpiles invariably damages the physical condition of the soil to a greater or lesser extent. If stockpiling is done incorrectly the physical condition of the soil can be damaged irreversibly, resulting in a loss of a valuable resource and potentially significant costs to the project. The Soil Resource Survey and Soil Resource Plan should set out any limitations that the soil may possess, with respect to handling, stripping and stockpiling.

5. The size and height of the stockpile will depend on several factors, including the amount of space available, the nature and composition of the soil, the prevailing weather conditions at the time of stripping and any planning conditions associated with the development. Stockpile heights of 3-4m are commonly used for topsoil that can be stripped and stockpiled in a dry state but heights may need to be greater where storage space is limited.

6. Soil moisture and soil consistency (plastic or non-plastic) are major factors when deciding on the size and height of the stockpile, and the method of formation. As a general rule, if the soil is dry (e.g. drier than the plastic limit) when it goes into the stockpile, the vast majority of it should remain dry during storage, and thereby enable dry soil to be excavated and respread at the end of the storage period. Soil in a dry and non-plastic state is less prone to compaction, tends to retain a proportion of its structure, will respread easily and break down into a suitable tilth for landscaping. Any anaerobic soil also usually becomes re-aerated in a matter of days.

7. Soil stockpiled wet or when plastic in consistency is easily compacted by the weight of soil above it and from the machinery handling it. In a compacted state, soil in the core of the stockpile remains wet and anaerobic for the duration of the storage period, is difficult to handle and respread and does not usually break down into a suitable tilth. A period of further drying and cultivation is then required before the soil becomes re-aerated and acceptable for landscaping.

Stockpiling methods

8. There are two principal methods for forming soil stockpiles, based on their soil moisture and consistency.

9. Method 1 should be applied to soil that is in a dry and non-plastic state. The aim is to create a large core of dry soil, and to restrict the amount of water that can get into the stockpile during the storage period. Dry soil that is stored in this manner can remain so for a period of years and it is reuseable within days of respreading.

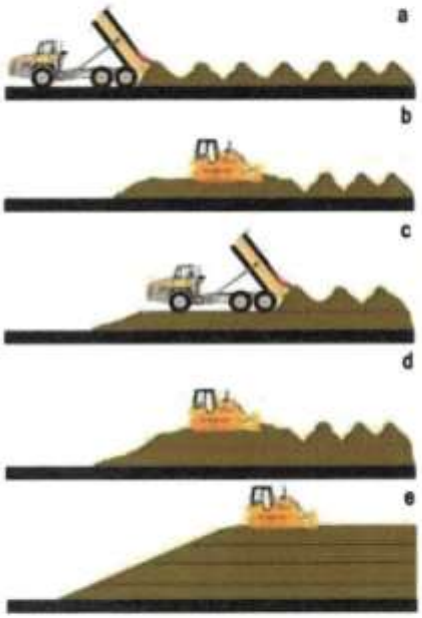
10. Method 2 should be applied if the construction programme or prevailing weather conditions result in soil having to be stockpiled when wet and/or plastic in consistency. This method minimises the amount of compaction, while at the same time maximising the surface area of the stockpile to enable the soil to dry out further. It also allows the soil to be heaped up into a 'Method 1' type stockpile, once it has dried out.

Soil stockpiling

Soil should be stored in an area of the site where it can be left undisturbed and will not interfere with site operations. Ground to be used for storing the topsoil should be cleared of vegetation and any waste arising from the development (e.g. building rubble and fill materials). Topsoil should first be stripped from any land to be used for storing subsoil.

Method 1 – Dry non-plastic soils

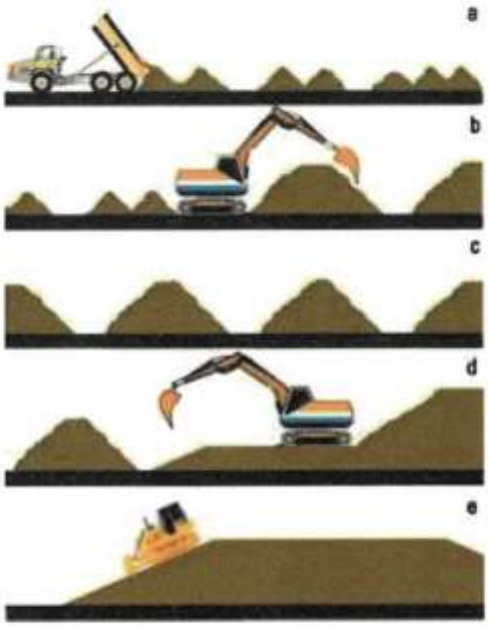
The soil is loose-tipped in heaps from a dump truck (a), starting at the furthest point in the storage area and working back toward the access point. When the entire storage area has been filled with heaps, a tracked machine (excavator or dozer) levels them (b) and firms the surface in order for a second layer of heaps to be tipped. This sequence is repeated (c & d) until the stockpile reaches its planned height. To help shed rainwater and prevent ponding and infiltration a tracked machine compacts and re-grades the sides and top of the stockpile (e) to form a smooth gradient.



Method 2 – Wet plastic soils

The soil is tipped in a line of heaps to form a 'windrow', starting at the furthest point in the storage area and working back toward the access point (a). Any additional windrows are spaced sufficiently apart to allow tracked plant to gain access between them so that the soil can be heaped up to a maximum height of 2m (b).
To avoid compaction, no machinery, even tracked plant, traverses the windrow.

Once the soil has dried out and is non-plastic in consistency (this usually requires several weeks of dry and windy or warm weather), the windrows are combined to form larger stockpiles, using a tracked excavator (d). The surface of the stockpile is then regraded and compacted (e) by a tracked machine (dozer or excavator) to reduce rainwater infiltration.



Stockpile location and stability

11. Stockpiles should not be positioned within the root or crown spread of trees, or adjacent to ditches, watercourses or existing or future excavations. Soil will have a natural angle of repose of up to 40° depending on texture and moisture content but, if stable stockpiles are to be formed, slope angles will normally need to be less than that. For stockpiles that are to be grass seeded and maintained, a maximum side slope of 1 in 2 (25°) is appropriate.

Stockpile protection and maintenance

12. Once the stockpile has been completed the area should be cordoned off with secure fencing to prevent any disturbance or contamination by other construction activities. If the soil is to be stockpiled for more than six months, the surface of the stockpiles should be seeded with a grass/clover mix to minimise soil erosion and to help reduce infestation by nuisance weeds that might spread seed onto adjacent land.

13. Management of weeds that do appear should be undertaken during the summer months, either by spraying to kill them or by mowing or strimming to prevent their seeds being shed.

Clearly defined stockpiling of different soil materials

Long term stockpile of stripped topsoil left with only weed vegetation

Greenacres Barn, Stoke Common Lane, Purton Stoke, Swindon, Wiltshire SN5 4LL
Telephone: 01793 771333 • Email: info@kernon.co.uk • Website: www.kernon.co.uk